

Technologies Enabling Distributed Spacecraft Missions (DSM), Phase I



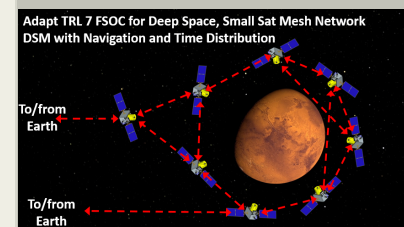
Completed Technology Project (2018 - 2019)

Project Introduction

This proposed SBIR is to develop new ultra-low SWaP-c technology that can transform Fibertek's compact laser terminal (CLCT) for low earth orbits into a Distributed Spacecraft Missions (DSM) terminal capable of laser communications and ranging to support small satellite intersatellite links (ISLs) as well as deep space downlinks to Earth or relay satellites. The technologies developed address a pointing solution that will allow multi-link connectivity with 4pi steradian coverage. We also propose to develop a rate and peak power adaptable SCPPM transceiver card that enables high data rate at close range and the ability to operate long range to support very large constellations or a linear train of science satellites as examples. The proposed technology leverages investments in a high TRL laser terminal made by NASA and commercial industry and enables a distributed small satellite mesh network at long ranges.

Anticipated Benefits

- NASA state-of-the-art mesh networked lasercom to support SCan deployment of optical coms
- Near Earth science missions – Small sat earth science lidar, radar, optical
- Deep space & Heliophysics – Space weather, sun studies, Mars network, Asteroid and small body science
- Lunar orbital networks with lunar uplink, orbital distribution and downlink to earth
- Future NASA SmallSat and CubeSat constellations needing optical coms for high data rates i.e. multispectral imaging sensors and radar
- Commercial space lasercom community needs space mesh networks to support earth resources data business
- DoD and U.S. Government for intelligence and contested, RF denied environments
- High data-rate, low cost commercial optical communications from LEO/GEO satellites
- High data-rate real-time feed from multiple UAVs via LEO/GEO crosslinks



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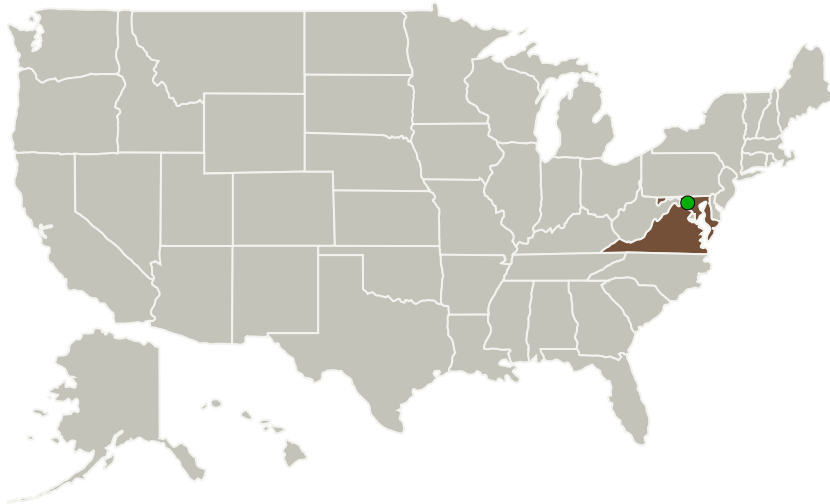
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Fibertek, Inc.	Lead Organization	Industry	Herndon, Virginia
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137360>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Fibertek, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

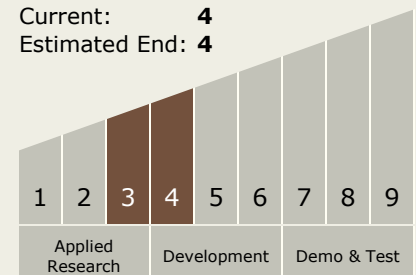
Carlos Torrez

Principal Investigator:

Nigel D Martin

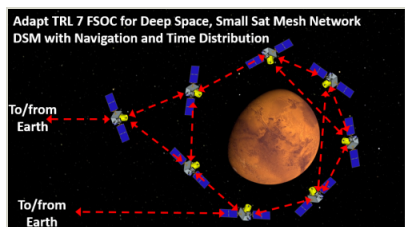
Technology Maturity (TRL)

Start: **3**
 Current: **4**
 Estimated End: **4**



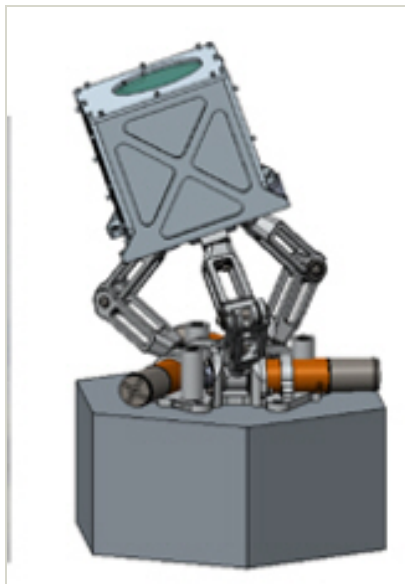


Images



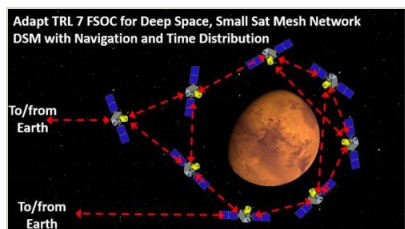
Briefing Chart Image

Technologies Enabling Distributed Spacecraft Missions (DSM), Phase I
(<https://techport.nasa.gov/image/131186>)



Final Summary Chart Image

Technologies Enabling Distributed Spacecraft Missions (DSM), Phase I
(<https://techport.nasa.gov/image/127233>)



Final Summary Chart Image

Technologies Enabling Distributed Spacecraft Missions (DSM), Phase I
(<https://techport.nasa.gov/image/132388>)

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.1 Optical Communications
 - └ TX05.1.6 Optometrics

Target Destination

Earth